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Thesis

THE AMOUNT OF MATHEMATICS USED IN LEISURE TIME

Submitted by

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(S. B., N. W. Nazarene College, 1927)

In partial fulfilment of requirements
for the degree of Master of Arts.

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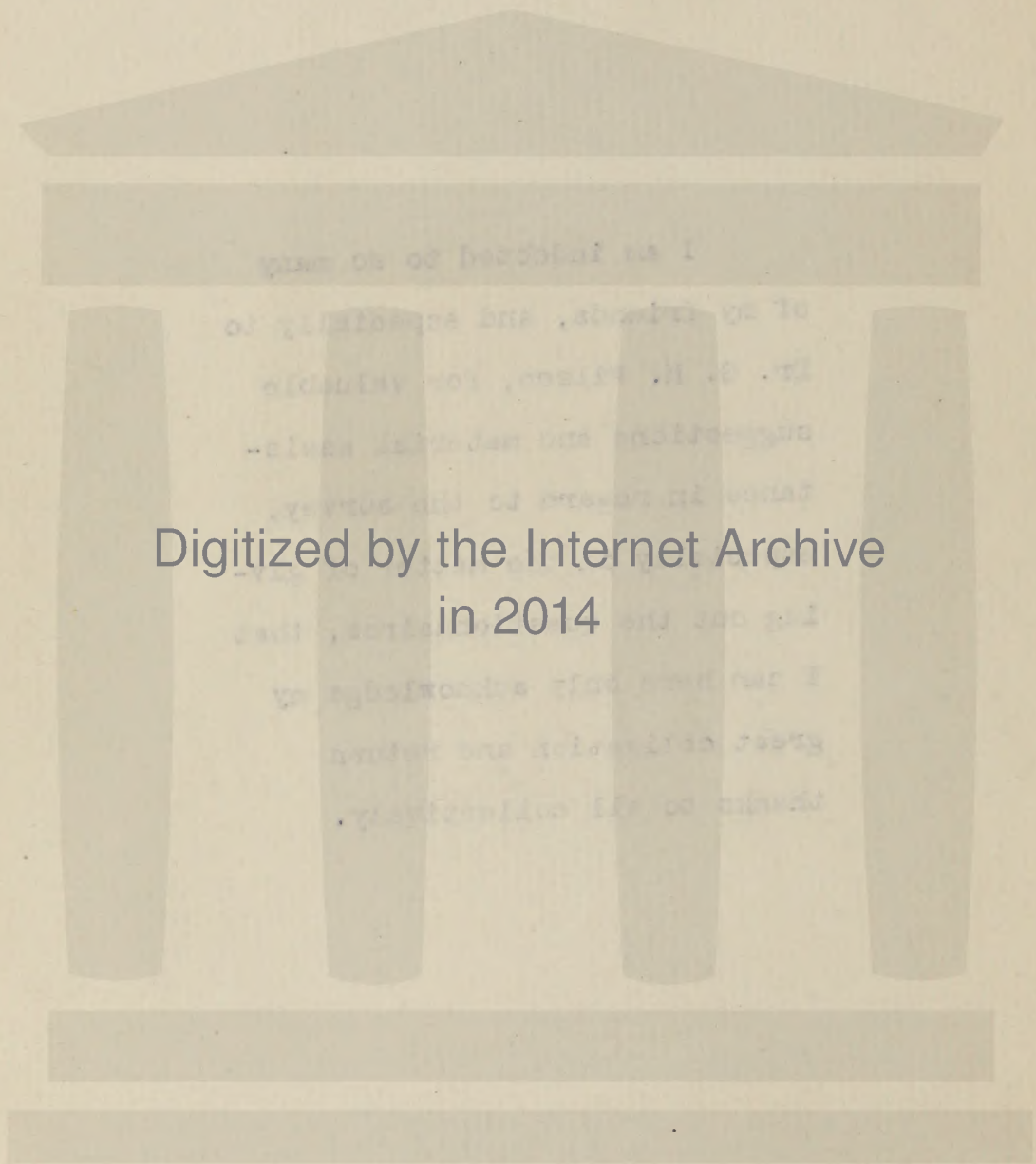
A C K N O W L E D G M E N T S

I am indebted to so many of my friends, and especially to Dr. G. M. Wilson, for valuable suggestions and material assistance in regard to the survey, especially in the matter of giving out the questionnaires, that I can here only acknowledge my great obligation and return thanks to all collectively.



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THE AMOUNT OF MATHEMATICS USED IN LEISURE TIME

PART I PROBLEM

The problem for solution in this survey is to determine the amount of mathematics used in leisure time. The term mathematics includes arithmetic and higher mathematics. The two items are dealt with separately in the survey.

A survey of this type is of special significance at the present time, because of the increased amount of leisure time. Leisure appears to be increasing for all classes. Due to the passage of such laws as the eight hour working law, and due to the increase of labor saving machinery, the working man has much more time to do as he desires.

Along with the shorter working hours and the labor saving machinery of the factory and office, go the improvements of the modern home which, likewise, add to the leisure hours of the housewife. The modern means of transportation benefit all classes. The trolley, the bus, and the automobile are real time savers. Miss Dorothy Canfield Fisher says, " In spite of our sensation of hurrying there is now vastly more leisure time than any other generation ever had. Not only are there fewer hours spent in work but most work is much

less physically exhausting and much less interesting. Hence, less time is taken in resting from the effects of it, and in thinking about it afterwards. Millions of human lives and human minds have new blank emptinesses which only a few in the race ever encountered before. This is certainly one of the forces which drives people to all this new reaching out after more education. But it also drives them to reach out for more excitement, more sports, more entertainments, more material possessions, more noise of any sort to fill the place in their lives formerly occupied by long hours of toil."[1]

However, not only is there an increase of leisure time but there is an urgent need for the right use of leisure time. This fact increases the importance of a study of this nature. The importance of the right use of leisure time cannot be over-estimated. History proves that when leisure time has been unwisely spent in self-indulgence civilization has declined. Persia and Rome afford us ample proof of this statement. " The Persian people had no need for home industry, and became fond of indolence and luxury. All this luxury was the fruit of war; but in time it produced a weak and effeminate people which lost the courage and vigor of their earlier days. "[2]

" All we can say is that the leisure classes of Rome

1. See Bibliography Page 1, No. 7
2. See Bibliography Page 2, No. 16

which are pictured in the pages of Ovid were by every standard we know a deleterious force and that the possession of wealth seems to have released them from mental as well as physical exercise. "[1]

This need of the worthy use of leisure time has already been acknowledged by certain among our professions. Take, for example, a doctor who, although he has already spent long years of training in school, must continue his study of medicine after he has received his diploma or drop out of the running. Likewise, teachers must employ part of their leisure time in studying educational magazines, by going to summer school, and occasionally taking a year off for study. The same is true of ministers and lawyers.

It is significant that the Commission on the Re-Organization of Secondary Education of the National Educational Association recognized the importance of leisure time when they gave " Worthy use of leisure time " as one of the " Seven Cardinal Principles of Secondary Education."[2]

Granted, that there is an increase in leisure time and that there is a need for a worthy use of it, the question now arises what are the present uses of leisure time ?

Amusement appears to be the first reaction to leisure time. George B. Cutten gives us some idea of the amount

1. See Bibliography Page 1, No. 8
2. See Bibliography Page 1, No. 2

of commercialized leisure in the following statements taken from his work, " The Threat Of Leisure ": " More money is spent in this country on commercialized leisure than on anything else except food, and more invested in this enterprise than anything except land. There are more than twenty million daily admissions to the moving picture exhibitions. Last year thirty million dollars were spent in admissions to circuses in this country. One large circus was seen by three and one-half million people, and more than one hundred million paid admissions to sporting events. The gate receipts of the Carpentier-Dempsey prize fight were $1,600,000, and of last year's baseball World's series over one million dollars. In the U. S., in 1925, the motor registration was twenty million, --- more than four fifths of the whole world. Twenty million people in America use the radio more or less. Five million people read the Saturday Evening Post, and, what is more encouraging, one million people are taking correspondence courses preparing for some employment. These give some indications as to the methods and forms of commercialized amusements, and the advantage which business has taken of the unattached leisure of the people. "[1]

However, there are greater opportunities to-day for culture than ever before. The facilities which afford

1. See Bibliography Page 1, No. 4

such means of development are many; such as newspapers, magazines, books, public libraries, museums, night schools, correspondence courses and summer courses.

It is necessary that people be trained to take advantage of these opportunities. Dean Inge, the famous " gloomy dean of England," did not exaggerate when he said recently, " The right use of leisure is no doubt a harder problem than the right use of our working hours. The soul is dyed the color of its leisure thought ' As a man thinketh in his heart so is he ' ".[1]

Before discussing my plan and its results, it is of interest to note that Miss Margaret Henchley made a similar study to find out how much mathematics was functioning in the leisure time of people. She came to the conclusion that " Mathematics is not functioning to any extent in the field of ' Worthy use of leisure time ' since only about 15% of those who studied it, ever turned to this subject for pleasure. "[2]

1. See Bibliography Page 1, No. 3
2. See Bibliography Page 1, No. 10

PART II THE SURVEY

The purpose of this survey is to determine, by the questionnaire method, the amount of mathematics used by people during their leisure time or to find out if mathematics is used by very many people in the worthy use of their leisure hours. The questionnaires were distributed among a miscellaneous group of people in order that the results might be more nearly representative of that section of the country where the survey was made. Furthermore, the aim is to find out by separate items, listed in the questionnaire, the number of people who spend time on arithmetic and the number of people who spend time on higher mathematics.

The questionnaire method was used to obtain the necessary material. At the beginning of the questionnaire full instructions as to procedure were given to the teacher and to the parent. Twelve items were listed vertically on the questionnaire and several spaces provided for additional items, in case some of the people wished to add other items. Ten of the items were common ways of spending leisure time. Two items only pertained to mathematics. They were designated as follows: playing with or reviewing arithmetic, and playing with or

reviewing higher mathematics. While I was not especially interested in the outcome of the other ten items, I felt it necessary to list them as I did not wish to have people conscious of my aim. If only the two items pertaining to mathematics were listed I feared many of the people, filling out the questionnaire, would think they had to find a way to spend some of their leisure time on mathematics. Whereas, if twelve items were listed, they would be more apt to omit the two items on mathematics in case no time was spent on these two items. The questionnaire provided means of recording the leisure time for seven successive days.

A copy of the questionnaire used in this survey may be found on the following page.

These questionnaires were sent out to principals and teachers of junior and senior high schools. The teachers gave out the questionnaires to the pupils who took them home. In some cases, the pupils obtained the information by questioning their parents. In other cases, the parents, themselves, filled out separate forms. When the leisure time of the parents had been recorded for seven successive days, the questionnaires were returned to the teachers.

The questionnaires were sent out to a score of places in New England. The following are the only ones which returned any of the questionnaires: Franklin, Maine;

HOW PEOPLE SPEND THEIR LEISURE TIME

METHOD

To the Teacher:

Enlist the interest and cooperation of the pupils in the seventh and eighth grades and in the high school. Pupils, with parents' help, or the parents will fill out separate forms for father and mother. When the leisure time of the parents has been recorded for seven successive days, pupils will return forms to the teacher.

To the Parent:

We are studying the ways in which people use their leisure time. Will you not help by checking on your own leisure time for a week, using the form below? Under items, indicate as many more ways of using leisure as you desire. Under time, indicate minutes spent on each item for seven successive days. Be specific. Do not indicate "Reading" as an item, but "Reading Shakespere" or "Reading the Daily Paper", and so for each item you add. Please indicate by a check after item eight if you have taken any higher mathematics.

USES OF LEISURE TIME FOR ONE WEEK.

ITEMS	TIME 1ST DAY	TIME 2ND DAY	TIME 3RD DAY	TIME 4TH DAY	TIME 5TH DAY	TIME 6TH DAY	TIME 7TH DAY	TOTALS
1. Reading daily paper.								
2. At the dance.								
3. Playing with or reviewing arithmetic.								
4. At the theatre.								
5. In religious service.								
6. At the club.								
7. Playing cards.								
8. [1] Playing with or reviewing higher mathematics.								
9. Auto riding.								
10. Walking.								
11. Exercising at the gym.								
12. Radio listening in.								

[1] By higher mathematics we mean algebra, geometry, trig., analysis, calculus.

Albion, Maine; Lowell, Massachusetts; Danbury, Connecticut; Fitchburg, Massachusetts; and Newtonville, Massachusetts.

Three thousand of the questionnaires were given out and only four hundred were returned to the teachers. This gives a slight idea of the difficulties in obtaining the replies. Various reasons accounted for the small return of the questionnaires. Many people had the idea that what they did with their leisure time was their own affair. For instance, in one of the large towns where the questionnaires were distributed, an article appeared in their leading newspaper shortly following the distribution of the questionnaires. The article condemned the questionnaires on the grounds that what one did with leisure time was one's own affair. As a result only a half dozen of the one hundred and fifty distributed were returned. Some of the parents did not care to have their children know what they did with their leisure time. Other parents did not care to spend the time necessary to keep a record of their leisure time for seven successive days. Although there are many, the above are a few of the reasons why it was difficult to get replies by means of the questionnaire method.

The data following are based on material received from the four hundred questionnaires. In the tables

and the figures the time is given and represented in minutes. Data are given on the twelve items listed in the questionnaire and on four items which were added by a few people. The four items are as follows: item 13 - visiting; item 14 - reading books and magazines; item 15 - music; and item 16 - sewing. The time spent on the last four items was small due to the fact that the majority of the people kept record of the twelve items only and did not choose to add other items.

TABLE I

GIVING RANGE OF EACH ITEM OF THE QUESTIONNAIRE, AS EXTENDED.

ITEMS	RANGE IN MINUTES
1. Reading daily paper.	0-900
2. At the dance.	0-1280
3. Playing with or reviewing arithmetic.	0-420
4. At the theatre.	0-1080
5. In religious service.	0-720
6. At the club.	0-1070
7. Playing cards.	0-825
8. Playing with or reviewing higher mathematics.	0-360
9. Auto riding.	0-860
10. Walking.	0-970
11. Exercising in the gym.	0-720
12. Radio listening in.	0-1680
13. Visiting.	0-870
14. Reading books and magazines.	0-1580
15. Music.	0-960
16. Sewing.	0-520

The first item, reading the daily paper, has a range from 0-900 minutes. This fact indicates that some of the four hundred people spent no time on this item and that at least one person out of the four hundred spent nine hundred minutes during the seven successive days reading the daily newspaper. Although the greatest range occurs in item fourteen, reading books and magazines, it is not especially significant as so few people added this item to the questionnaire. Item eight, playing with or reviewing higher mathematics, has the smallest range. Item three, playing with or reviewing arithmetic, had next to the lowest range.

TABLE II

GIVING THE MEDIANS OF THE SIXTEEN ITEMS OF THE QUESTIONNAIRE, AS EXTENDED.

ITEMS	MEDIANS IN MINUTES
1. Reading daily paper.	150
2. At the dance.	0
3. Playing with or reviewing arithmetic.	0
4. At the theatre.	150
5. In religious service.	40
6. At the club.	0
7. Playing cards.	0
8. Playing with or reviewing higher mathematics.	0
9. Auto riding.	0
10. Walking.	95
11. Exercising in the gym.	0
12. Radio listening in.	10
13. Visiting.	0
14. Reading books and magazines.	0
15. Music.	0
16. Sewing.	0

The median of item one, reading the daily paper, is given in table two as one hundred and fifty minutes. The time spent on each item was arranged according to magnitude. In item one, the two hundredth place or the median is one hundred and fifty minutes. Most of the medians are zero because less than two hundred people, or less than half of the total number of people who filled out the questionnaires spent time on the items which have zero for their medians. It is interesting to note that the medians of the two items on mathematics are zero. The two highest medians are item one, reading the daily paper, and item four, at the theatre, both of which have the same median, one hundred and fifty minutes.

TABLE III

SHOWING THE NUMBER OF PEOPLE OUT OF 400 TOTAL SPENDING TIME ON THE VARIOUS ITEMS OF QUESTIONNAIRE, AS EXTENDED.

ITEMS	NUMBER OF PEOPLE
1. Reading daily paper.	381
2. At the dance.	76
3. Playing with or reviewing arithmetic.	86
4. At the theatre.	256
5. In religious service.	223
6. At the club.	97
7. Playing cards.	184
8. Playing with or reviewing higher mathematics.	16
9. Auto riding.	165
10. Walking.	301
11. Exercising in the gym.	126
12. Radio listening in.	202
13. Visiting.	33
14. Reading books and magazines.	77
15. Music.	34
16. Sewing.	14

Item one, reading the daily paper, shows that out of four hundred people reporting, three hundred and eighty-one spent some time on this item. Items three and eight, which deal with mathematics, indicate that eighty-six people spent some time on arithmetic and that only sixteen people spent any time on higher mathematics.

No method was used to find how many of the four hundred people had taken arithmetic. However, I have assumed that all of the four hundred people had taken arithmetic and believe that this is not far from the truth. One hundred and twenty-one people placed a check after item eight indicating that they had taken some higher mathematics. Thus, it is more significant to say that sixteen out of one hundred and twenty-one, rather than sixteen out of four hundred, spent some of their leisure time on higher mathematics.

TABLE IV

GIVING PERCENTAGE OF 400 PEOPLE ANSWERING QUESTIONNAIRE SPENDING ANY TIME ON THE SIXTEEN ITEMS OF QUESTIONNAIRE, AS EXTENDED

ITEMS	PERCENTAGES
1. Reading daily paper.	95.25
2. At the dance.	19.00
3. Playing with or reviewing arithmetic.	21.5
4. At the theatre.	64.00
5. In religious service.	55.75
6. At the club.	24.25
7. Playing cards.	46.00
8. Playing with or reviewing higher mathematics.	4.00
9. Auto riding.	41,25
10. Walking.	75.25
11. Exercising in the gym.	31.5
12. Radio listening in.	50.5
13. Visiting.	8.25
14. Reading books and magazines.	19.25
15. Music.	8.5
16. Sewing.	3.5

Table four shows that 95.25% of the four hundred people spent some of their leisure time reading the daily paper, that 21.5% spent some of their leisure time on arithmetic, and that 4% spent some of their leisure time on higher mathematics. One hundred and twenty-one people out of four hundred people had taken higher mathematics. Only 13.2% of the hundred and twenty-one spent some of their leisure time on higher mathematics. The 13.2% is more significant than the 4% because you could hardly expect those who had not taken higher mathematics to spend any of their leisure time on that item.

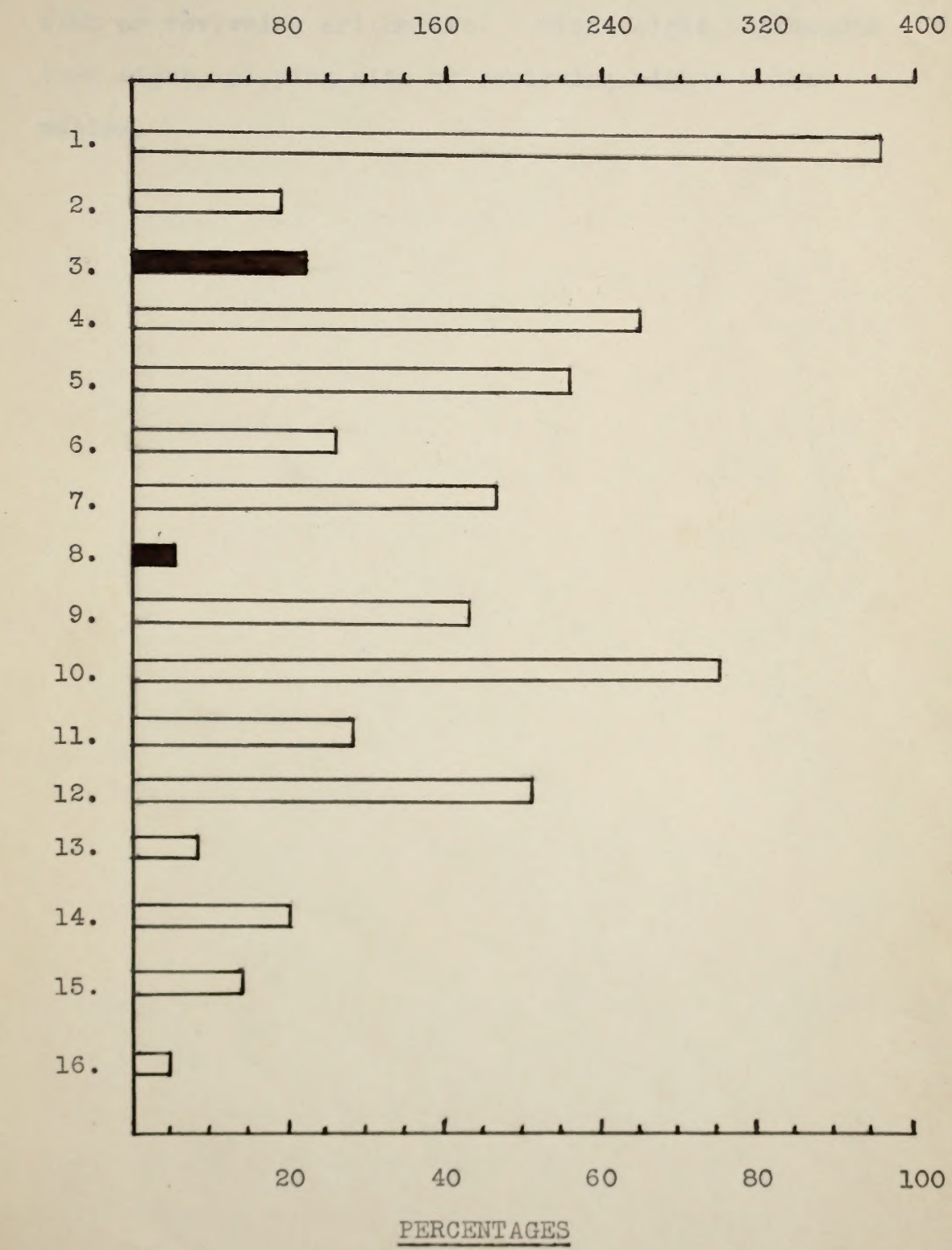

Figure 1. Graphic Representation of Tables III and IV.

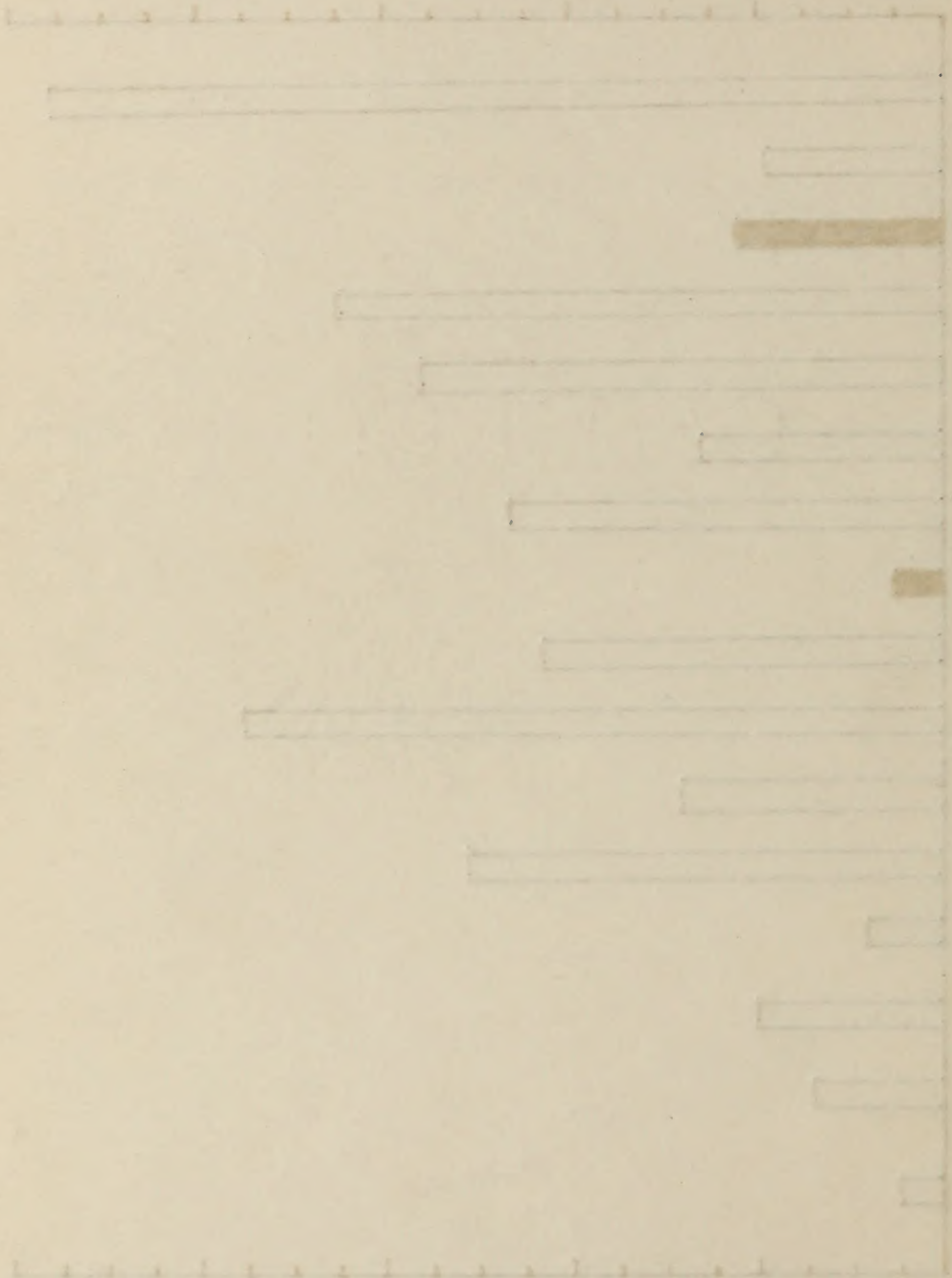

Figure 1 is a graphic representation of Tables III and IV. Block three represents item three, playing with or reviewing arithmetic. Block eight represents item eight, playing with or reviewing higher mathematics.

PART III CONCLUSION

Seventy-six people out of four hundred people, or 21.5%, spent some of their leisure time on arithmetic, and sixteen people out of four hundred people, or 4%, spent some of their leisure time on higher mathematics. One hundred and twenty-one is the largest number of people who would probably spend any of their leisure time on higher mathematics. This is due to the fact that only one hundred and twenty-one people indicated by a check after item eight of the questionnaire that they had taken any higher mathematics. Therefore, it is unlikely that people who had not studied higher mathematics would spend any time on it. In this case, sixteen out of one hundred and twenty-one, or 13.2%, spent some of their leisure on higher mathematics. Thus, we must conclude that mathematics plays a very small part in the worthy use of leisure time because only a few of the four hundred people, who filled out the questionnaires, used mathematics during their leisure hours.

The advantages of the questionnaire method are many. The questionnaire is simple in its construction. It can easily be followed by teachers and parents. It re-

quires merely the recording of facts and does not ask for a statement of opinion. The data gathered were given willingly and through the sincere cooperation of teachers, parents and pupils. The principal disadvantage of the questionnaire method is the difficulty in securing replies. These difficulties I have discussed at length on page nine.

From this study, it is apparent that people in later life do not care to pursue their work in mathematics for pleasure alone or to spend their leisure hours profitably in this way. It may be concluded from this survey that either the content of the courses is not sufficiently interesting to instill in the students a desire to continue the study of mathematics for pleasure or that the content of the courses is not such that it can be used for practical purposes outside of certain occupations. It is evident that amusements and other diversions, including those along educational lines, have a greater attraction for the majority of the people than mathematics during their leisure hours.

In conclusion the survey has shown that the amount of mathematics used in leisure time is very small.

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